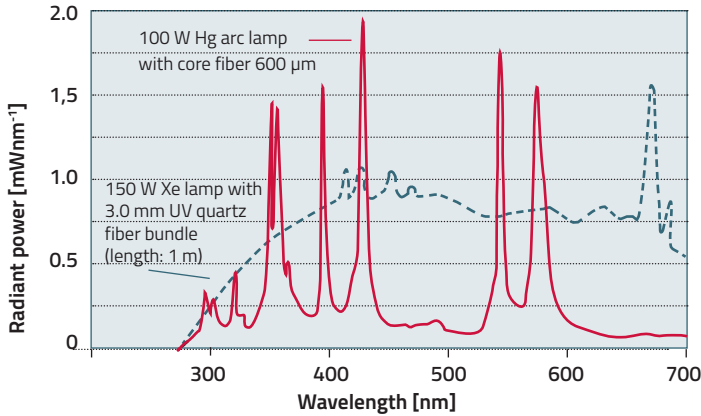


Fiber coupling for light sources

Guidelines

Typical output through fiber optics.



- Broadband UV to VIS-IR spectrum
- Complete versatility for filtering fiber input



Light source with coupled fiber

With appropriate accessories, our light sources can easily be operated as fiber optic light sources. Hg and Xe arc lamps up to 200 W are preferred sources for UV and visible light, because their relatively small arcs allow very efficient coupling of light into optical fibers.

Which accessories?

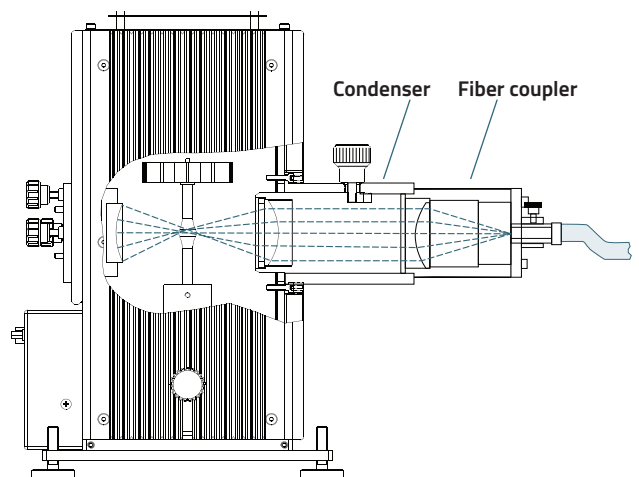
The principle is shown in the figure. Our housings with condensing optics produce a collimated beam. For coupling light into the fiber the collimated beam has to be refocused with a secondary lens. The lens has to be chosen in such a way that the F/number is matched to the acceptance cone of the fiber. We offer several fiber coupling devices, that are already equipped with the correct secondary focusing lens.

Advantage: flexible

We offer different fiber couplers: for glass fiber bundles, for UV quartz fiber bundles and a model optimized for fibers with diameters <800 µm. All fiber couplers can be mounted directly to the lightsource condenser and accept the fiber bundle at the output.

Learn more in our [Light source accessories](#) brochure.

Our light sources with condensing optics produce a parallel beam, so any accessory which fits between condenser and fiber optic coupler can be used. This is especially important when using filters, etc.



Operation principle of light source with coupled fiber

Fiber coupling for light sources

Guidelines

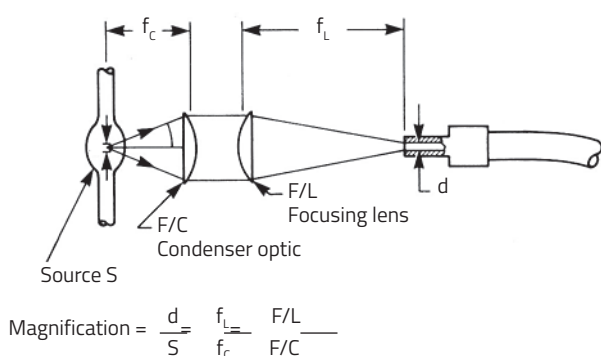
Which type of lamp?

There are two main criteria for choosing a lamp: wavelength range and optical diameter of the fiber resp. fiber bundle. It is for example not possible to couple more light into a 400 μm fiber when using a 1000 W Xe arc lamp instead of a 75 W Xe arc lamp. This is because the radiance cannot be increased by imaging the arc. The arcs of lamps with higher powers are relatively large. But the radiance of a 1000 W Xe arc lamp is not higher than that of a 75 W Xe arc lamp.

For most efficient fiber coupling always consider the geometrical circumstances of the source and fiber diameter.

Choose the fiber diameter according to the source dimensions or vice versa. And take into account that you have to multiply the source dimensions by the magnification. The magnified dimensions should just fill the fiber.

The fig. below shows a simplified approach that may help in selecting a source, the source optics and matching them to the fiber geometry.



Large core fiber or fiber bundle?

You can choose between large core fibers and fiber bundles. The difference lies in transmission and diameter. Large core fibers are available in diameters up to 1000 μm. Fiber bundles are available with optical diameters of a few single fibers (typ. 100 μm) to several centimeters.

Guidelines

Interference filters, fiber bundles and in particular liquid light guides should absorb as little radiation as possible, particularly IR.

- Turn the reflective side of the filter towards the incoming light.
- Use the fiber in a beam as large as possible. Never focus a beam on a filter.
- Use a beam turner with a dichroic mirror or the combination of a water filter and IR absorbing glass. Because of the non-reversible effects we recommend that the temperature of the filters does not exceed 70 °C and that the rise in temperature does not exceed 5 °C per minute.

For lamps with 200 W and more, we recommend a water filter or beam splitter with dichroic mirror in order to filter out the IR. For lamps with 300 W and more it is in any case necessary to remove the IR (water filter), otherwise the fiber bundles (and optical filters) may be destroyed.

Fiber optic coupling assemblies

These assemblies focus the collimated light from our light sources into a fiber or fiber bundle. One end has a male flange to couple to the light source; the other accepts fiber bundles with an 11 mm adapter.



Ordering information fiber optic coupling assemblies			
Part number	Condenser size [mm]	Lens	To use with
LSZ153	25/35	f/0.9 Glass	Glass fiber bundles with $\varnothing \geq 2 - 3$ mm
LSZ152	25/35	f/2.0 UV Quartz	Quartz fiber bundles with $\varnothing \geq 1 - 3$ mm
LSZ155	25/35	f/2.0 UV Quartz	Quartz fiber bundles with $\varnothing \leq 800$ μm
LSZ151	25/35	f/0.9 UV Quartz	UV VIS liquid light guide with $\varnothing \geq 3 - 5$ mm
LSZ250	50	f/1.3 Glass	Glass fiber bundles with $\varnothing \geq 3 - 5$ mm
LSZ251	50	f/2.5 UV Quartz	Quartz fiber bundles with $\varnothing \geq 3 - 5$ mm
LSZ252	50	f/1.3 UV quartz	UV VIS liquid light guide with $\varnothing \geq 3 - 5$ mm